Autonomous Aerial Cargo/Utility Systems

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At a Glance

What is it?

- The Autonomous Aerial Cargo/Utility System Innovative Naval Prototype program explores advanced autonomous capabilities for reliable resupply/retrograde and, in the long term, casualty evacuation by an unmanned air vehicle under adverse conditions. Key features include a vehicle autonomously avoiding obstacles while finding and landing at an unprepared landing site in dynamic conditions, with goal-directed supervisory control by a field operator with no special training.

What will it accomplish?

- Due to an open architecture approach for global management of mission planning data, AACUS technologies will be platform agnostic and be transferable to both new and legacy cargo unmanned aerial systems (CUASs). AACUS-enabled CUASs will rapidly respond to requests for support in all weather conditions, be launched from sea and land, fly in high/hot environments, and autonomously detect and negotiate precision landing sites in potentially hostile settings. Such missions could require significant obstacle and threat avoidance, with aggressive maneuvering in the descent-to-land phase.

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The Autonomous Aerial Cargo/Utility System (AACUS) is an Office of Naval Research (ONR) Innovative Naval Prototype (INP) program with a fiscal year 2012 start, sponsored through the ONR's Office of Innovation. The need for AACUS stems primarily from U.S. Marine Corps requirements for "an alternate means to provide time-sensitive logistics support to greatly disbursed locations. Cargo UASs can provide a solution to move tailored ammunition, supplies, fuel/water, or weapons packages in adverse weather from the sea or ashore over harsh terrain as required (24/7)." *--Universal Needs Statement (UNS) For the Cargo UAS*

While VTOL systems have significant advantages over other means of resupply and evacuation, including avoidance of improvised explosive devices and greater speed over trucks, manned VTOL aircraft are often limited by weather, hostile conditions, and manning constraints, which are mitigated when using unmanned aerial vehicles. Recent progress has been made in Cargo Unmanned Aerial System (CUAS) autonomous cargo drops and deliveries, however, such advances rely upon the presence of prepared, obstacle free landing sites as well as trained CUAS operators with some level of control over flight parameters.

The AACUS INP represents a substantial leap over both present-day operations as well as other more near-term CUAS development programs as it is focused on autonomous obstacle avoidance and unprepared landing site selection, with precision landing capabilities including contingency management until the point of landing. AACUS includes a goal-based supervisory control component such that any field personnel can request and negotiate a desired landing site. Moreover, this system will communicate with ground personnel for seamless and safe loading and unloading.

Another unique aspect of the AACUS INP is its portability - this system will be VTOL platform agnostic with an associated open architecture framework that allows it to be used across different air vehicle platforms.

This INP builds on several previous and current small business technology transfer efforts including:

- N10A-T039: Autonomous Landing at Unprepared Sites for a Cargo Unmanned Air System
- N111-070: Scalable Warfighter Interface to Support a High-level Interactions with an Autonomous Cargo and Casualty Evacuation Unmanned Air System at Remote, Unprepared Sites
- A07-032: Multi-Agent Based Small Unit Effects Planning and Collaborative Engagement with Unmanned Systems